

WHAT IS CLAIMED IS:

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1. An ink tank for an ink-jet printing apparatus comprising:

(i) an ink container containing an ink;

5 (ii) an ink inlet for introducing an ink to the ink container; and

(iii) an air outlet for making the ink container under negative pressure in cooperation with the ink-jet printing apparatus, an ink being introduced to the ink container through the ink inlet when negative pressure is applied to the ink container,

10 wherein the ink tank further comprises gas-liquid separation means which does not pass liquid but gas at the air outlet, and wherein the ink has surface tension of 28 mN/m or higher but not higher than 50 mN/m.

15 2. The ink tank according to claim 1, wherein the gas-liquid separation means comprises a porous material.

20 3. The ink tank according to claim 2, wherein the porous material is a porous resin material.

25 4. The ink tank according to claim 3, wherein the porous resin material is a tetrafluoroethylene resin.

5. The ink tank according to claim 2, wherein the

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porous material is selected from the group consisting of unglazed porcelain, earthenware and ceramics.

5 6. The ink tank according to claim 1, wherein the ink tank contains an ink absorbing member capable of absorbing and holding the ink in the ink container.

10 7. The ink tank according to claim 6, wherein the ink tank has a space between the gas-liquid separation means and the ink absorbing member.

8. The ink tank according to claim 1, wherein an inner surface of the ink container has been subjected to a surface processing.

15 9. The ink tank according to claim 8, where the surface processing is a water-repellent processing.

20 10. The ink tank according to claim 1, wherein the ink tank further comprises an ink outlet for discharging the ink in the ink container outside.

25 11. The ink tank according to claim 10, wherein an ink-jet recording head capable of ejecting the ink is connected to the ink outlet.

12. The ink tank according to claim 1, wherein

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the ink has surface tension of 35 mN/m or higher and not higher than 50 mN/m.

13. An ink cartridge comprising an ink tank of claim 1 and an ink-jet recording head for ejecting an ink in the ink tank.

14. An ink cartridge comprising an ink tank of claim 1 and an ink-jet recording head for ejecting the ink in the ink tank, wherein the ink-jet recording head is connected to the ink outlet of the ink tank.

15. In an ink supply device for providing an ink to a first ink tank of claim 1, the device comprising:

- (i) a second ink tank for storing the ink to be introduced to the ink container of the first ink tank;
- (ii) means for connecting the second ink tank with the ink inlet of the first ink tank; and
- (iii) means for reducing a pressure in the ink container of the first ink tank through the air outlet of the first ink tank when the second ink tank is connected to the ink inlet of the first tank.

16. The ink supply device according to claim 15, wherein the connection means comprises an ink supply path communicated to the second ink tank, and a joint at an end of the ink supply path, the joint being

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connectable to the ink inlet of the first ink tank.

17. The ink supply device according to claim 16,  
wherein the ink inlet of the first ink tank is provided  
5 with a hollow needle, and the ink is introduced from  
the second ink tank to the ink container through the  
needle and wherein the joint unit connects to the  
needle.

10 18. The ink supply device according to claim 15,  
wherein the pressure reducing means comprises a suction  
pump to reduce a pressure in the ink container through  
the air outlet.

15 19. An ink to be contained in an ink tank for an  
ink-jet printing apparatus,

the ink tank comprising an ink container, an ink  
inlet for introducing an ink to the ink container, an  
air outlet for making the ink container under negative  
20 pressure in cooperation with the ink-jet printing  
apparatus and a gas-liquid separation means provided  
at the air outlet which does not pass liquid but gas,  
the ink being introduced to the ink container through  
the ink inlet when negative pressure is applied to the  
25 ink container,

the ink comprising a coloring material, a liquid  
medium and a surfactant at a content of 1% by weight or

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less.

20. The ink according to claim 19, wherein the content of the surfactant is not higher than 0.5 wt %.

21. The ink according to claim 20, wherein the content of the surfactant is not higher than 0.2 wt %.

22. The ink according to claim 20 or 21, wherein the content of the surfactant is higher than 0.05 wt %.

23. The ink according to claim 22, wherein the content of the surfactant is higher than 0.1 wt %.

24. The ink according to claim 19, wherein the ink is an ink-jet ink.

25. An ink tank for an ink-jet printing apparatus, comprising

(i) an ink container containing an ink;

(ii) an ink inlet for introducing an ink to the ink container; and

(iii) an air outlet for making the ink container under negative pressure in cooperation with the ink-jet printing apparatus, an ink being introduced to the ink container through the ink inlet when negative pressure is applied to the ink container.

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5 wherein the ink tank further comprises a gas-liquid separation means which does not pass liquid but gas at the air outlet, and wherein the ink contains a surfactant in an amount of 1wt% or less based on the total ink weight.

26. A process for introducing an ink to a first ink tank for an ink-jet printing apparatus, the first ink tank comprising

10 (i) an ink container containing an ink;

(ii) an ink inlet for introducing an ink to the ink container;

15 (iii) an air outlet for making the ink container under negative pressure in cooperation with the ink-jet printing apparatus, an ink being introduced to the ink container through the ink inlet when negative pressure is applied to the ink container; and

(iv) gas-liquid separation means which does not pass liquid but gas at the air outlet,

20 the process comprising the steps of:

connecting a second ink tank containing an ink to be introduced into the ink container of the first ink to the ink inlet; and

25 reducing pressure of the ink container of the first ink tank while the second ink tank and the ink inlet are being connected.

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27. The method according to claim 26, wherein the gas-liquid separating means comprises a gas permeable membrane made of a porous material.

5           28. The method according to claim 27, wherein the gas permeable membrane is a resin porous material.

10           29. The method according to claim 28, wherein the resin porous material is a tetrafluoroethylene resin.

15           30. The method according to claim 26, wherein the method further comprises a step of stopping ink supply to the ink container when an ink level in the ink container has reached to the gas-liquid separation means.

31. An ink tank for an ink-jet printing apparatus, comprising:

20           (i) an ink container containing an ink;  
          (ii) an ink inlet for introducing an ink into the ink container; and

25           (iii) an air outlet for making the ink container under negative pressure in cooperation with the ink-jet printing apparatus, an ink being introduced to the ink container through the ink inlet when negative pressure is applied to the ink container,

          wherein the ink tank further comprises a gas-

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liquid separation membrane which does not pass liquid but gas at the air outlet, and wherein the ink is free from disturbing gas permeability of the membrane.

5      32. An ink-jet ink not deteriorating a gas-liquid separating function of a gas-liquid separating membrane when the ink contacts the separating membrane.

10      33. The ink-jet ink according to claim 32, wherein the ink does not easily form a meniscus in a pore of the gas-liquid separating membrane.

15      34. An image recording device comprising a combination of an ink cartridge of claim 13 and an ink supply device of claim 15.

20      35. An image recording device comprising a combination of an ink cartridge of claim 13 or 14, and an ink supply device of claim 15.

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